SPECIFICATION

INPUT: 90-260V AC

OUTPUT: +24V/5A
       +12V/3A
       +5V/2.5A
       +5VSB/0.5A

OUTPUT +5V/2.5A

OUTPUT +5V/2.5A(OPTION)

NEW STANDARD CONECTION   **OLD CONECTION**
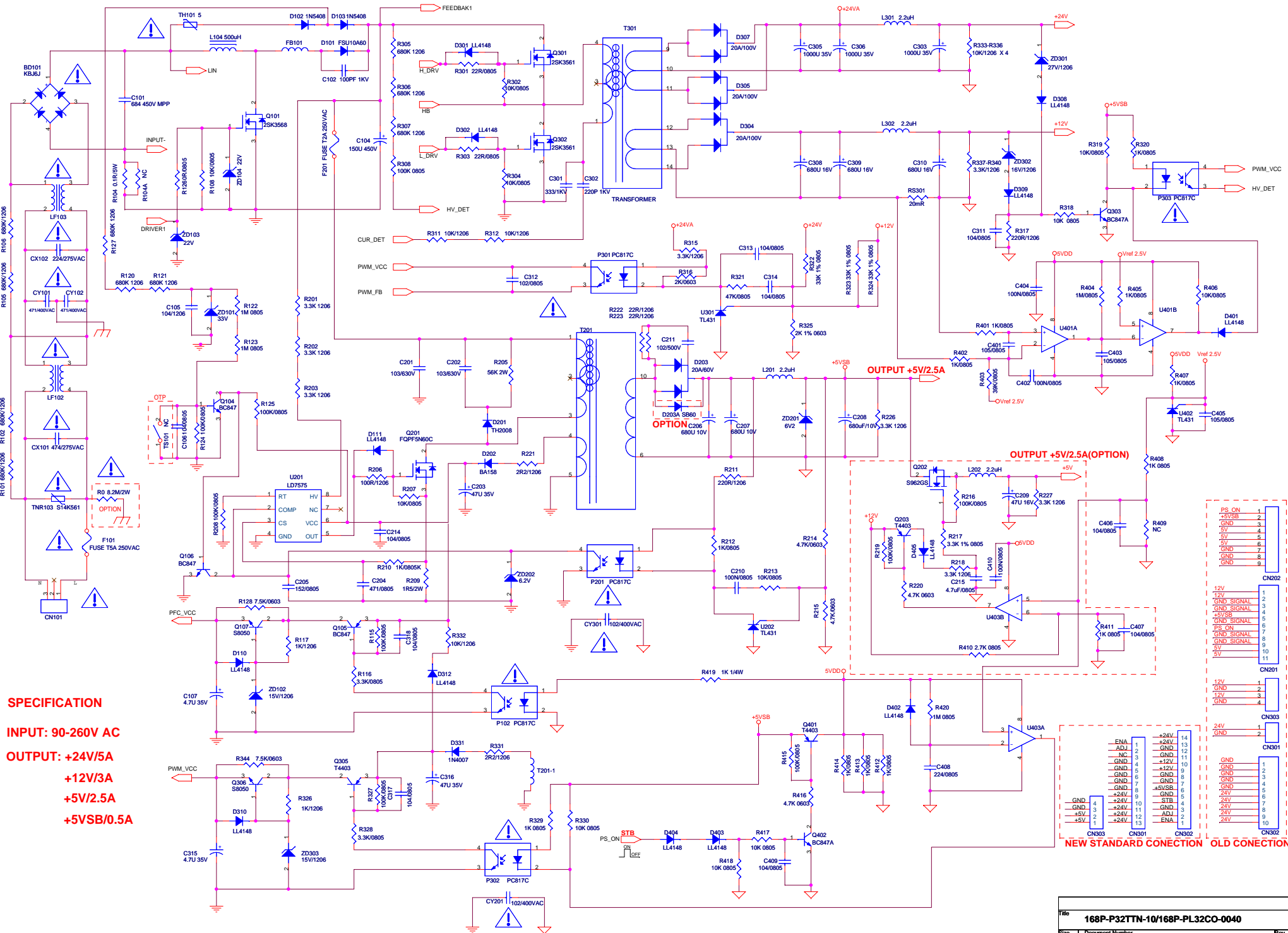
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168P-P32TTN-10/168P-PL32CO-0040		
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Date:	Sunday, September 27, 2009	Sheet 1 of 3

LIN

R600
1M/1206

R601
1M/1206

R602
1M/1206

R603
1M/1206

R604
0R/0805

R606
470K/1206

R611
510K/1206

R612
510K/1206

FEEDBAK1

R610
470K/1206

R609
470K/1206

VCC1

C606
100N/0805

C607
100N/0805

U601
NCP1653

1 FB   Vcc 8

2 Vcontrol   DRV 7

3 In   GND 6

4 CS   VM   5

Q602
T4401

R613   100R/0805

R614
4.7K/0603

R615
39R/0805

DRIVER1

R616
2R2/0805

Q601
T4403

C601
100N/0805

C602
1N/0805

C603
683/100V

C604
2.2N/0805

R607
2.7K/0805

R608
56K/0603

C605
1N/0805

INPUT-

Title
168P-P32TTN-10/168P-PL32CO-00

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Date: Monday, September 21, 2009   Sheet   2   of   3

警　告

　　本手册□供有□□的□修人□使用，不适用于一般消□者，手册中没有□非技□人□企□□修本□品

而存在的潜在危害提出警告或提醒。□器□品□由有□□的□□技□人□□行□□和修理，任何其它人企

□□本手册涉及的□品□行□□和修理将有可能受到□重□害甚至有生命危□。

1 □品□述

1.1 □源概述

　　□款□源□ 32 寸通用新□准□源接□；兼容外□＋5V/2.5A 的需求；整机待机功耗≤1W　（240V

AC Load 50mA）；保□功能□全；成本□低；方案架构成熟；□□范□□ 90-264V □□源□□□入。

1.2 主要技□□格

1.2.1 □入特性

Input voltage range □入□□	90Vac to 264Vac
Normal voltage range □称□入	100Vac to 240Vac
Frequency range　　□率范□	50Hz/60Hz±5%
Max input ac current　□□□入□流	3Amax at 90VAC input & full load condition
Inrush current (cold start)　浪涌□流	50Atyp peak, 120Vac; 100Atyp peak, 220Vac
Efficiency(full load)　效率	82%min @ 115Vac,Full Load
Harmonic current　　□波□流	Meet GB17625.1-1998/IEC61000-3-2 class D
Leakage Current　　泄漏□流	Less Than 0.75mA, 230Vac input
Standby Power Loss　待机功耗	≤1W, 240Vac input,30mA Load
Input Fuse　　　□入保□	T5AH/250Vac

1.2.2 □出特性

Output Voltage □出□□	Regulation □整率	Min. current 最小□流	Rated current □定□流	Peak current 峰□□流
+24V	+24V±5%	0.2A	5.0A	7.5A *
+12V	+12V±5%	0.1A	2.5A	3.0A *
+5V	+5V±5%	0.1A	2.5A	3A* （Option）
+5VSB	+5V±5%	0.01A	0.5A	1.0A

Note:* pulse width within 100ms 脉□小于 100 毫秒。

1.2.3 □出□波和噪声

Output Voltage	Ripple & Noise (Max.)
+24V	240mVp-p@25℃；350mVp-p@-10℃
+12V	120mVp-p@25℃；200mVp-p@-10℃
+5V	100mVp-p@25℃；200mVp-p@-10℃；（Option）
+5VSB	100mVp-p@25℃；200mVp-p@-10℃；

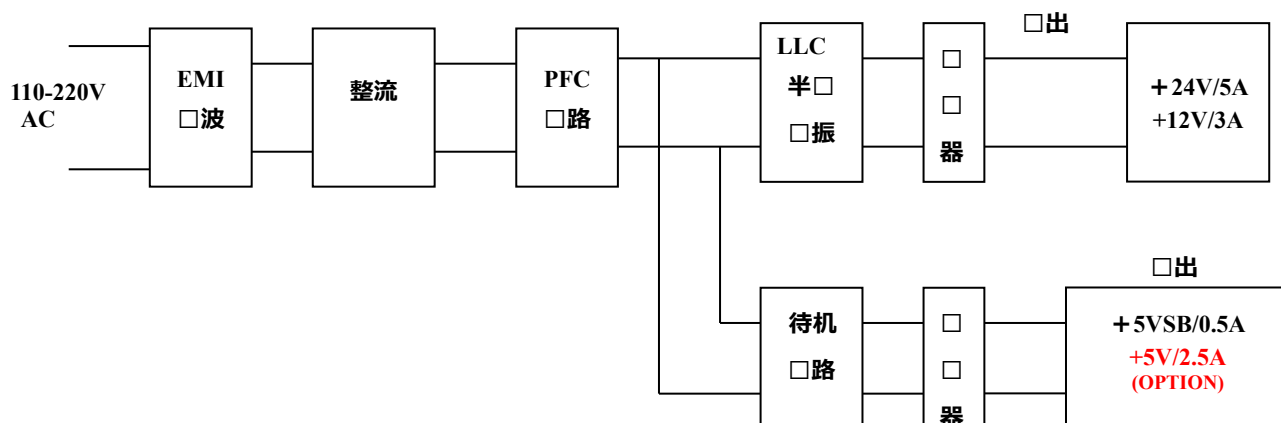Note: 1) Measurements shall be made with an oscilloscope with 20MHz bandwidth.

示波器□□□□置在 20 兆赫兹。

2) Outputs shall be bypassed at the connector with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor to simulate system loading.

□源□出端并□ 0.1uF 的陶瓷□容和 10uF 的□解□容来模□□□□□。

2 □路介□

2.1 □源□□路框□

2.2 各部分□路介□

2.2.1 PFC □路部分：ON-SEMI NCP1653A

主要特性：

a、CCM □通工作模式；

b、平均□流模式或峰□□流模式（可□）；

c、恒定□出□□模式或□□跟随模式；

d、外□元件少；

e、固定开关□率 NCP1653A □ 67KHz；

f、开机□启□功能；

g、□□和欠□保□功能（高于正常□出的 107%和低于 8%）；

h、VCC 欠□□定功能；

i、□流保□点和□功率限制可自行□定；

j、芯片自身□保□。

2.2.2 LLC □路部分： ON-SEMI NCP1396A

主要特性：

　　a、50KHz 到 500KHz 的□率工作范□；

　　b、600V 高□浮□□□；

　　c、100ns 到 2us 的可□死区□□；

　　d、□启□功能；

　　e、Brown-out 功能；

　　f、□酷条件下□定□入的能力，如□□□定；

　　g、VCC 工作□□可达 20V；

　　h、300uA 低启□□流；

　　i、1A/0.5A 峰□□流源□□能力；

　　j、内部温度保□功能；

　　h、因延□反□而自□恢复工作的功能。

2.2.3 待机□路部分： LEADTREND 7575

　　主要特性：

　　a、高□（500V）启□□路；

　　b、□流模式控制；

　　c、无噪声□色模式；

　　d、低□□定功能；

　　e、CS 脚上升沿消□功能；

　　f、开关□率可□定；

　　g、内部斜率□□功能；

　　h、□□保□功能（OVP）；

　　i、□□保□功能(OLP)；

　　g、500mA □□能力。

3 主要芯片介□

3.1 PFC 芯片

3.1.1 芯片概述

　　□ IC □ PFC（功率因数校正）芯片，使用安森美的 NCP1653A，□ CCM（□□□通模式），工作□率□ 67KHz。

3.1.2 芯片内部框□

3.1.3 芯片管脚□

(Top View)
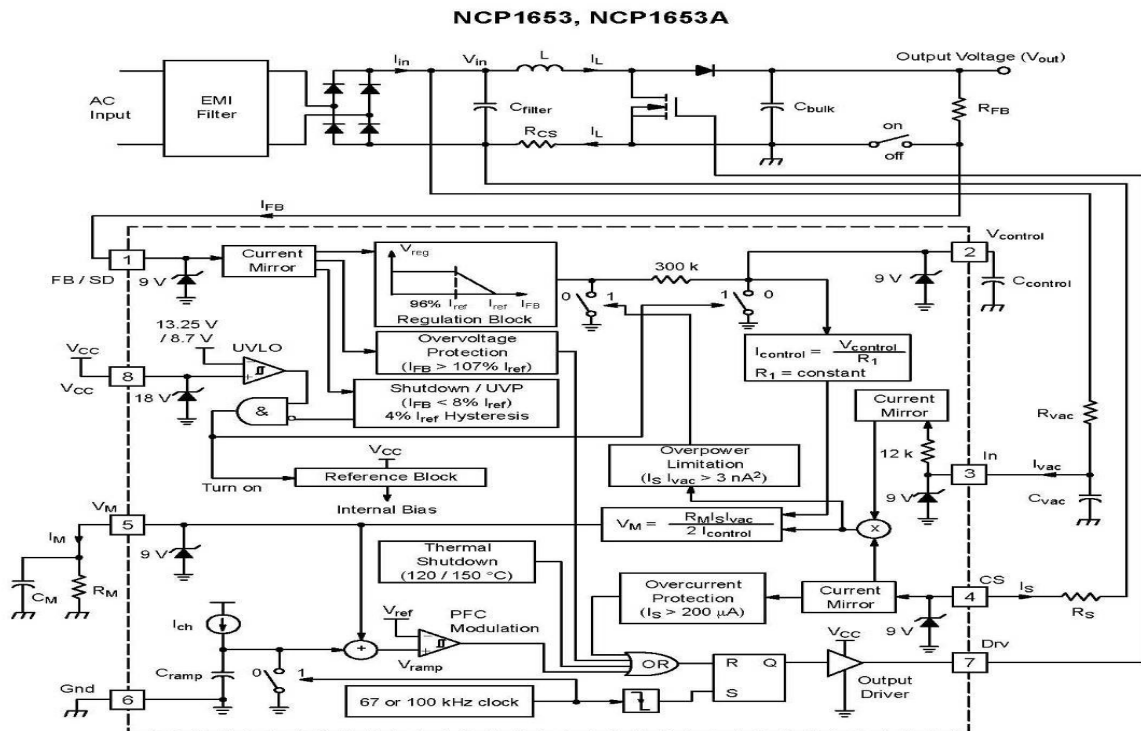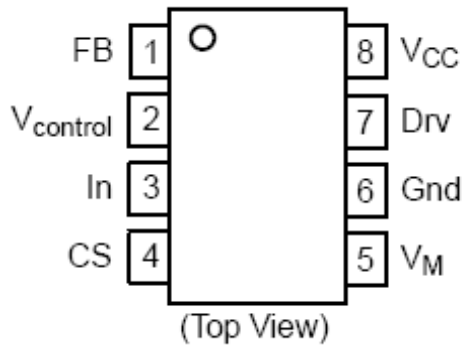
3.1.4 芯片重要引脚功能及□□工作□□

Pin	Symbol	Name	Function
1	FB / SD	Feedback / Shutdown	This pin receives a feedback current I_{FB} which is proportional to the PFC circuit output voltage. The current is for output regulation, output overvoltage protection (OVP), and output undervoltage protection (UVP). When I_{FB} goes above 107% I_{ref}, OVP is activated and the Drive Output is disabled. When I_{FB} goes below 8% I_{ref}, the device enters a low-consumption shutdown mode.
2	$V_{control}$	Control Voltage / Soft-Start	The voltage of this pin $V_{control}$ directly controls the input impedance and hence the power factor of the circuit. This pin is connected to an external capacitor $C_{control}$ to limit the $V_{control}$ bandwidth typically below 20 Hz to achieve near unity power factor. The device provides no output when $V_{control}$ = 0 V. Hence, $C_{control}$ also works as a soft-start capacitor.
3	In	Input Voltage Sense	This pin sinks an input-voltage current I_{vac} which is proportional to the RMS input voltage V_{ac}. The current I_{vac} is for overpower limitation (OPL) and PFC duty cycle modulation. When the product ($I_S \cdot I_{vac}$) goes above 3 nA^2, OPL is activated and the Drive Output duty ratio is reduced by pulling down $V_{control}$ indirectly to reduce the input power.
4	CS	Input Current Sense	This pin sources a current I_S which is proportional to the inductor current I_L. The sense current I_S is for overcurrent protection (OCP), overpower limitation (OPL) and PFC duty cycle modulation. When I_S goes above 200 μA, OCP is activated and the Drive Output is disabled.
5	V_M	Multiplier Voltage	This pin provides a voltage V_M for the PFC duty cycle modulation. The input impedance of the PFC circuit is proportional to the resistor R_M externally connected to this pin. The device operates in average current-mode if an external capacitor C_M is connected to the pin. Otherwise, it operates in peak current-mode.
6	GND	The IC Ground	–
7	Drv	Drive Output	This pin provides an output to an external MOSFET.
8	V_{CC}	Supply Voltage	This pin is the positive supply of the device. The operating range is between 8.75 V and 18 V with UVLO start threshold 13.25 V.

3.2 LLC □□芯片

3.2.1 芯片概述

□ IC □□源半□□振□□ IC，使用安森美的 NCP1396。通□□置合适的死区□□来控制半□上管和下管的□流□通，□ IC 有 50KHz 到 500KHz 的□率工作范□；100ns 到 2us 的可□死区□□；300uA 低启□□流；1A/0.5A 峰□□流源□□能力。
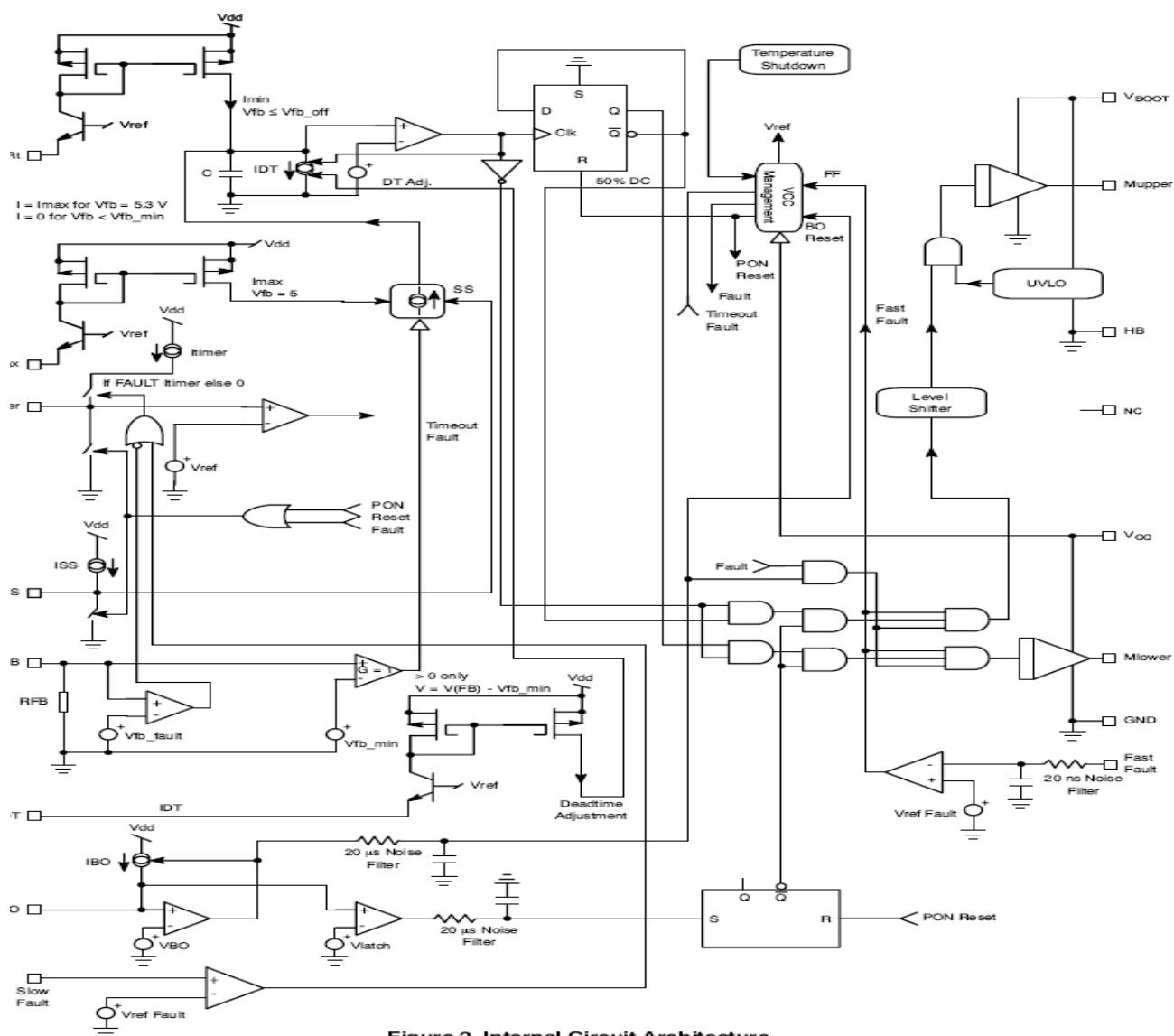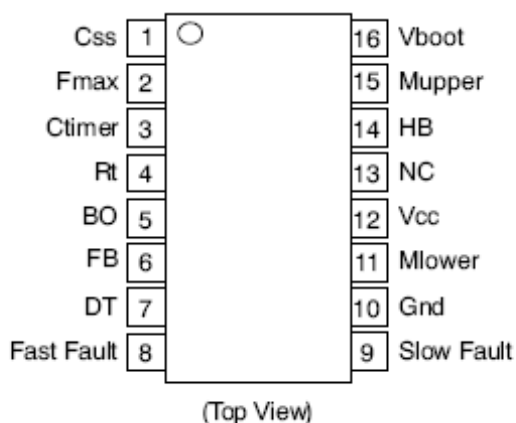
3.2.2 芯片内部框□

Figure 2. Internal Circuit Architecture

3.2.3 芯片管脚□

Css	1	16	Vboot
Fmax	2	15	Mupper
Ctimer	3	14	HB
Rt	4	13	NC
BO	5	12	Vcc
FB	6	11	Mlower
DT	7	10	Gnd
Fast Fault	8	9	Slow Fault

(Top View)

3.2.4 芯片重要引脚功能及□□工作□□

Pin No.	Pin Name	Function	Pin Description
1	Css	Soft-start	Select the soft-start duration
2	Fmax	Frequency clamp	A resistor sets the maximum frequency excursion
3	Ctimer	Timer duration	Sets the timer duration in presence of a fault
4	Rt	Timing resistor	Connecting a resistor to this pin, sets the minimum oscillator frequency reached for VFB = 1 V
5	BO	Brown-Out	Detects low input voltage conditions. When brought above Vlatch, it fully latches off the controller.
6	FB	Feedback	Injecting current in this pin increases the oscillation frequency up to Fmax.
7	DT	Dead-time	A simple resistor adjusts the dead-time width
8	Fast Fault	Quick fault detection	Fast shut-down pin. Upon release, a clean startup sequence occurs. Can be used for skip cycle purposes.
9	Slow Fault	Slow fault detection	When asserted, the timer starts to countdown and shuts down the controller at the end of its time duration.
10	Gnd	Analog ground	-
11	Mlower	Low side output	Drives the lower side MOSFET
12	Vcc	Supplies the controller	The controller accepts up to 20 V
13	NC	Not connected	Increases the creepage distance
14	HB	Half-bridge connection	Connects to the half-bridge output
15	Mupper	High side output	Drives the higher side MOSFET
16	Vboot	Bootstrap pin	The floating V_{CC} supply for the upper stage

3.3 LLC □□芯片

3.3.1 芯片概述

□ IC □待机芯片，使用通嘉的 LD7575，有 CS 脚上升沿消□功能；500mA □□能力；□□保□功能（OVP）；□□保□功能(OLP)功能。

3.3.2 芯片内部框□
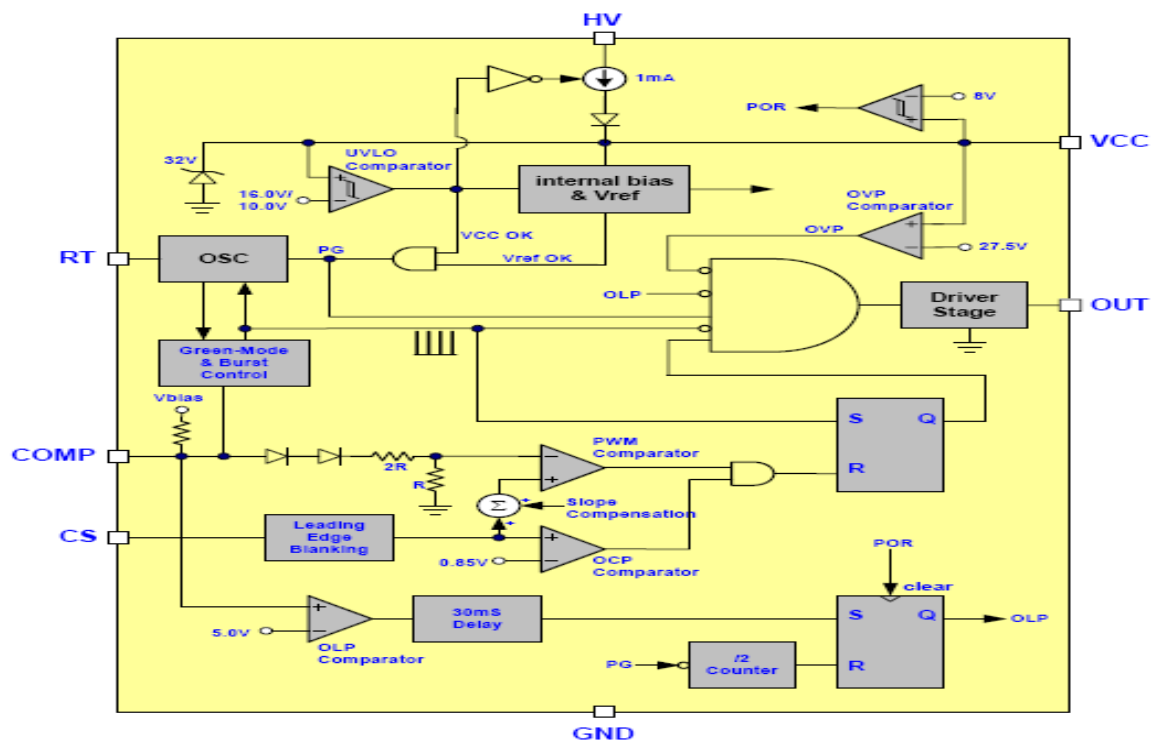
3.3.3 芯片管脚□

3.3.4 芯片重要引脚功能及□□工作□□

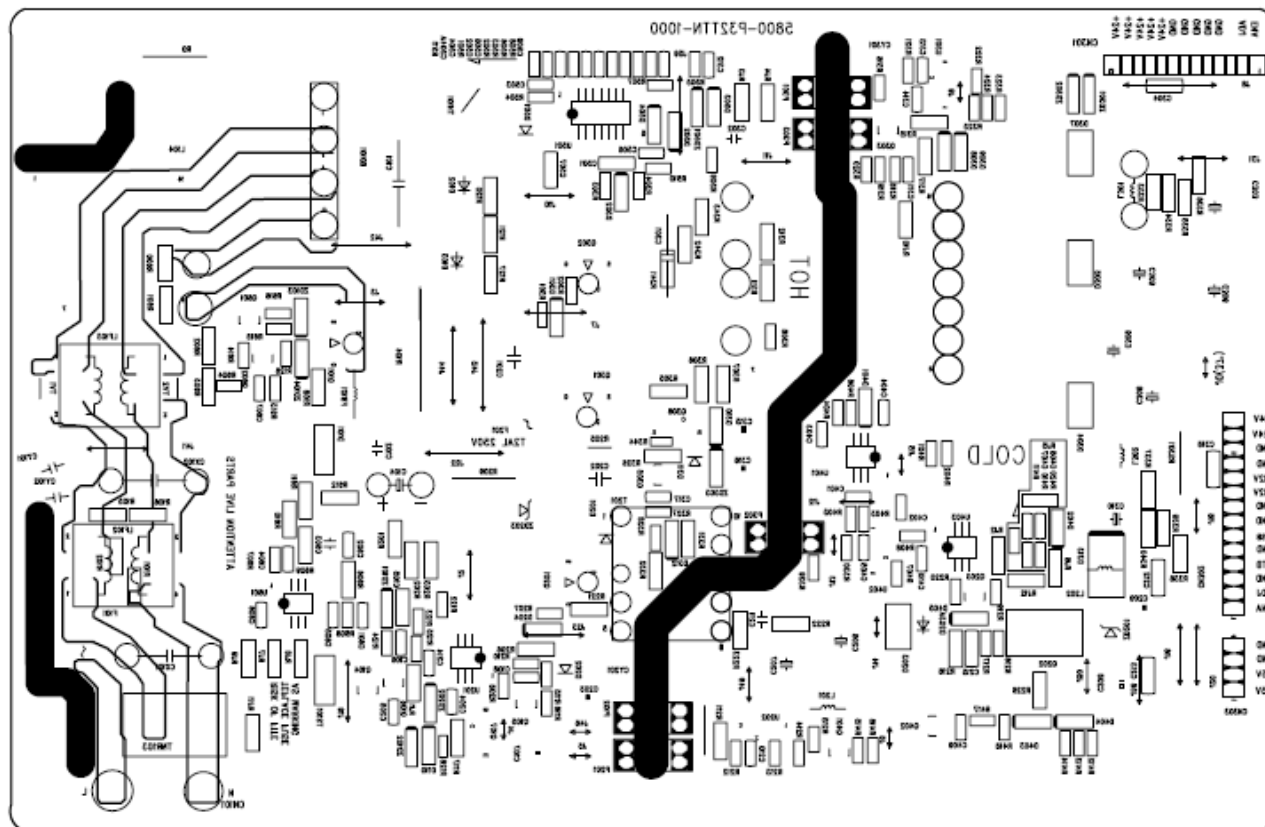| PIN	NAME	FUNCTION
1	RT	This pin is to program the switching frequency.　By connecting a resistor to ground to set the switching frequency.
2	COMP	Voltage feedback pin (same as the COMP pin in UC384X), By connecting a photo-coupler to close the control loop and achieve the regulation.
3	CS	Current sense pin, connect to sense the MOSFET current
4	GND	Ground
5	OUT	Gate drive output to drive the external MOSFET
6	VCC	Supply voltage pin
7	NC	Unconnected Pin
8	HV	Connect this pin to positive terminal of bulk capacitor to provide the startup current for the controller. When Vcc voltage trips the UVLO(on), this HV loop will be off to save the power loss on the startup circuit.

4 PCB □/底□□印

4.1 □源板□□□印□

4.2 □源板底□□印□

5 □修□明

5.1 常□故障分析与注意事□

1、无+5VSB □出□□

若无+5VSB □□，□重点□□待机 IC U201 是否正常工作，主要□□其 VCC 脚供□□是否正常，若正常，□先确□待机 IC 外□□路是否异常，其次确□待机 IC 是否□坏。若 VCC 脚□□不正常，□需□□待机 IC 的供□□路是否异常。

2、有+5VSB，无+12V 和+24V □出

第一步，确□ PS_ON 是否□高□平。

第二步，用万用表确□ U601(PFC 芯片)和 U501(LLC 芯片)的 VCC □□。若异常，□□□所□□的供□□路，若正常，□先分别□□ IC 外□原件，确□外□无异常后，

第三步，□□ IC 是否□坏。

3、+5VSB □□异常

□□+5VSB 的反□回路，□□ U202(TL431)的参考□□是否正常，其次确□光耦 P201 是否□坏。

5.2 端口及□□定□

5.2.1 PIN13 CN301 插座定□

NO.	Pin Connection	Function
1	+24VDC	+24VDC OUTPUT
2	+24VDC	+24VDC OUTPUT
3	+24VDC	+24VDC OUTPUT
4	+24VDC	+24VDC OUTPUT
5	+24VDC	+24VDC OUTPUT
6	GND	+24VDC RETURN
7	GND	+24VDC RETURN

8	GND	+24VDC RETURN
9	GND	+24VDC RETURN
10	GND	+24VDC RETURN
11	GND	NC
12	ADJ	BL_ADJUST
13	ENA	BL_ON/OFF

Note: CON301 TYPE : 2.0mm

5.2.2 PIN14 CN302 插座定口

NO.	Pin Connection	Function
1	+24V	+24VDC OUTPUT
2	+24V	+24VDC OUTPUT
3	GND	GND
4	GND	GND
5	+12V	+12V DC OUTPUT
6	+12V	+12V DC OUTPUT
7	GND	GND
8	GND	GND
9	+5VSB	+5VSB DC OUTPUT
10	GND	GND

11	STB	POWER_ON/OFF
12	GND	GND
13	ADJ	BL_ADJUST
14	ENA	BL_ON/OFF

Note: CN302 TYPE : 2.5mm

5.3 关□元器件及□□修□件清□

序号	物料□号	物料型号	位号	名称/功能 /参数	代用物 料□号	□ 注
1	471U-N16532-0080	NCP1653A	U601	PFC 芯片		
2	471U-N13960-16	NCP1396A	U501	LLC 芯片		
3	47C3-L75750-08	LD7575PS	U201	待机芯片		
4	4600-K35680-0000	2SK3568	Q101	PFC MOG 管	4600-F12500-0000	
5	4600-K35610-0000	2SK3561	Q301 Q302	LLC 上管 LLC 下管		
6	4619-F5N600-00	FQPF5N60C	Q201	待机 MOS 管	4600-K26450-00	
7	4500-210A60-02	FSU10A60	D101	PFC 肖特基		
8	4500-220A10-00	100V20A	D304 D305 D307	次□肖特基	4500-208050-00	
9	5100-063508-0000		T301	主□□器		
10	5100-062504-0000		T201	待机□□器		
11	4734-P817C0-04	PC817C	P102 P201 P301 P302 P303	光耦		